Dosage Calculation in Pediatrics

Dosage calculation in pediatrics involves determining the correct dose of medication for a child based on their age, weight, and medical condition. I learned and applied standard dose calculation guidelines during my pediatric PharmD internship at Government Medical College and Hospital, Chhatrapati Sambhajinagar.

Here are the general steps:

Step 1: Determine the Child's Weight

- Obtain the child's current weight in kilograms (kg) or pounds (lb)
- Convert weight to kg if necessary (1 lb = 0.45 kg)

Step 2: Choose the Correct Dose Calculation Method

- Body Surface Area (BSA) method: Use for medications with a narrow therapeutic index (e.g., chemotherapy)
- Milligrams per kilogram (mg/kg) method: Use for most medications
- Volume-based method: Use for medications with a fixed volume (e.g., vaccines)

Step 3: Calculate the Dose

- BSA method: Dose (mg) = BSA (m^2) x dose per m^2
- mg/kg method: Dose (mg) = weight (kg) x dose per kg
- Volume-based method: Dose (mL) = fixed volume

Step 4: Round the Dose to a Practical Value

- Round the calculated dose to the nearest whole number or decimal place (e.g., 2.5 mL → 2.5 mL or 3 mL)

Step 5: Verify the Dose

- Check the calculated dose against the recommended dose range
- Consult with a pharmacist or pediatrician if unsure

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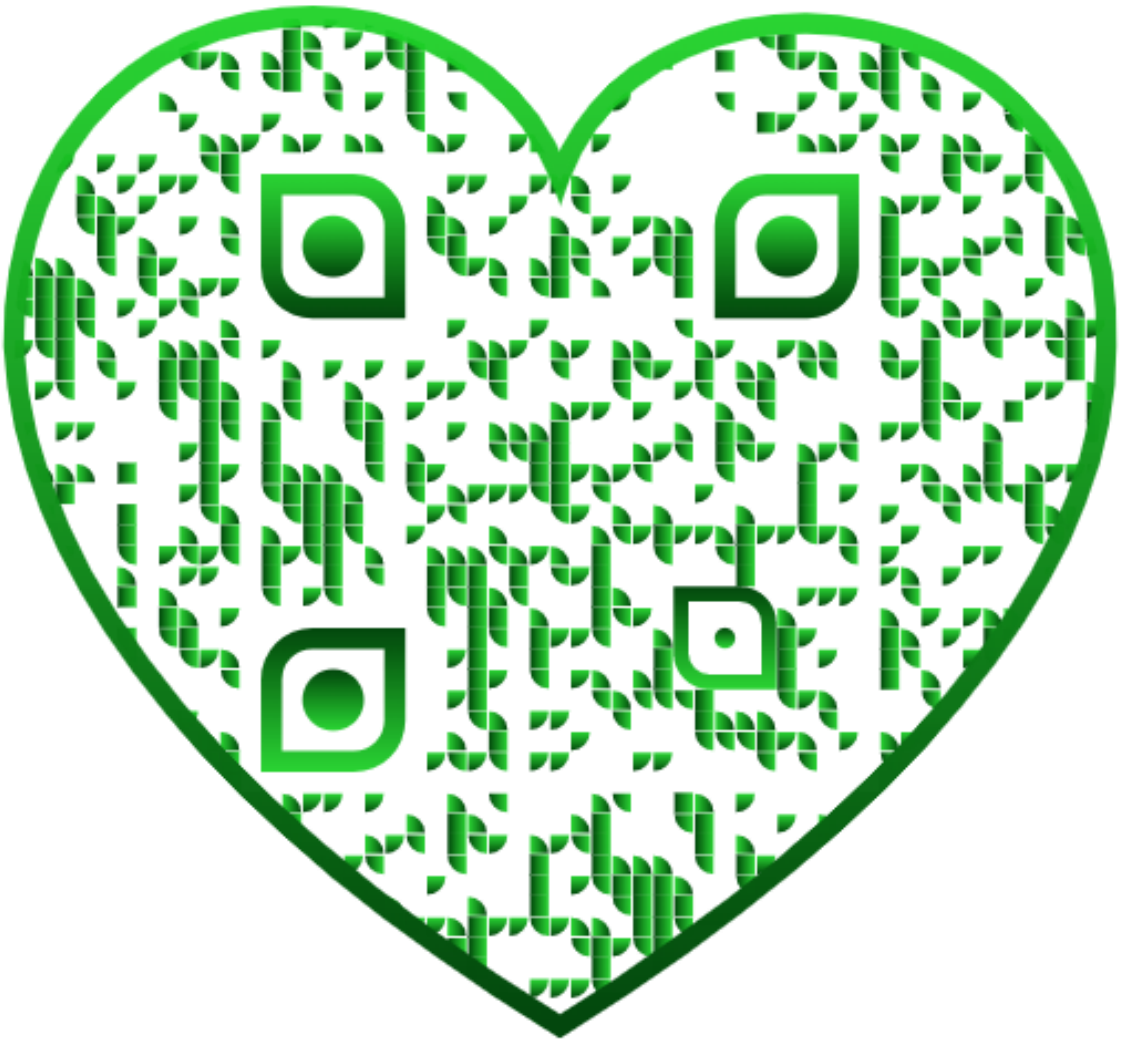

Example Calculations:

- **mg/kg method:** A child weighs 10 kg and needs a dose of 5 mg/kg of acetaminophen. Dose (mg) = 10 kg x 5 mg/kg = 50 mg
- **BSA method:** A child has a BSA of 0.5 m^2 and needs a dose of 20 mg/m^2 of chemotherapy. Dose (mg) = 0.5 m^2 x 20 mg/m^2 = 10 mg

Sr. No.	Drugs	Drug Class	Dose Calculation
1	**Ampicillin**	Beta-lactam antibiotic (penicillin class)	- **Dose**: 50-100 mg/kg/day divided into 4-6 doses - Child's weight: 20 kg - **Dose calculation**: 50 mg/kg x 20 kg = 1000 mg/day - Divided doses: 1000 mg/day ÷ 4 doses = 250 mg/dose
2	**Amikacin**	Aminoglycoside antibiotic	- **Dose:** 10-15 mg/kg/day divided into 2-3 doses - Child's weight: 20 kg **- Dose calculation**: 10 mg/kg x 20 kg = 200 mg/day - Divided doses: 200 mg/day ÷ 2 doses = 100 mg/dose
4	**Gentamicin**	Aminoglycoside antibiotic	- **Dose**: 5-7.5 mg/kg/day divided into 2-3 doses - Child's weight: 15 kg **- Dose calculation**: 5 mg/kg x 15 kg = 75 mg/day - Divided doses: 75 mg/day ÷ 2 doses = 37.5 mg/dose
5	**Vancomycin**	Glycopeptide antibiotic	**- Dose**: 10-15 mg/kg/dose every 6-12 hours - Child's weight: 10 kg - **Dose calculation**: 10 mg/kg x 10 kg = 100 mg/dose

6	**Meropenem**	Carbapenem antibiotic (beta-lactam class)	**- Dose**: 20-40 mg/kg/dose every 8 hours - Child's weight: 25 kg - Dose calculation: 20 mg/kg x 25 kg = 500 mg/dose
7	**Paracetamol**	Analgesic	**- Dose**: 15-20 mg/kg/dose every 4-6 hours - Child's weight: 15 kg - **Dose calculation**: 15 mg/kg x 15 kg = 225 mg/dose
8	**Primaquine**	Antimalarial	- **Dose**: 0.5-1 mg/kg/day for 14 days - Child's weight: 20 kg **- Dose calculation**: 0.5 mg/kg x 20 kg = 10 mg/day
9	**Phenobarbitone**	Anticonvulsant	- **Dose:** 4-6 mg/kg/day divided into 2-3 doses - Child's weight: 15 kg - **Dose calculation**: 4 mg/kg x 15 kg = 60 mg/day - Divided doses: 60 mg/day ÷ 2 doses = 30 mg/dose
10	**Ondansetron**	Antiemetic	**- Dose:** 0.1-0.2 mg/kg/dose every 4-6 hours - Child's weight: 10 kg **- Dose calculation**: 0.1 mg/kg x 10 kg = 1 mg/dose
11	**Pantoprazole**	Proton Pump Inhibitor	- **Dose:** 1-2 mg/kg/day divided into 1-2 doses - Child's weight: 20 kg - **Dose calculation**: 1 mg/kg x 20 kg = 20 mg/day
12	**Prednisolone**	Corticosteroids	-**Dose**: 0.1-2 mg/kg PO daily, depending on the treated condition.

13	**Chloroquine**	Antimalarial	**Dose**: 10 mg/kg (base) PO, followed by 5 mg/kg (base) PO at 6, 24, and 48 hours after the initial dose. **Maximum dose**: 500 mg (base) PO per dose.
14	**Clobazam**	Benzodiazepine	**Initial dose**: 0.1-0.3 mg/kg/day PO, divided into 2-3 doses. **Maintenance dose**: 0.3-0.6 mg/kg/day PO, divided into 2-3 doses. **Maximum dose:** 0.8-1.2 mg/kg/day PO, divided into 2-3 doses.
15	**Clonazepam**	Benzodiazepine	**Initial dose:** 0.01-0.03 mg/kg/day in 2-3 divided doses; titrate dose by < 0.25-0.5 mg every third day, until seizures are controlled or adverse effects are observed. **Maximum dose**: 0.05 mg/kg/day **Maintenance dose**: 0.1-0.2 mg/kg/day in 3 divided doses.
16	**Topiramate**	Anticonvulsant	**Initial dose:** 0.5-1 mg/kg/day BD Doses may be titrated in 0.5-1 mg/kg/day increments at 5-7 day intervals, depending on clinical response. (Topiramate is not first-line treatment, but may be considered in refractory cases)
17	**Levetiracetam**	Anticonvulsant	**Initial dose: 500** mg BID Titrated to the recommended dose of 1500 mg BD in increments of 500 mg/dose BD every 2 weeks.
18	**Ceftriaxone**		**Susceptible infection** **General dosing** **IM,IV** **Mild to mod:** 50-75 mg/kg/day OD Maximum dose: 1000 mg/day

			Severe: 100mg/kg/day divided in every 12-24 hours; maximum dose is 4000 mg/day
19	**Cefotaxim**	Third generation; cephalosporin	**Susceptible infection** **General dosing** **IM,IV** 150-180 mg/kg/day in divided doses Q8H. Maximum dose: 8g/day Higher dose are necessary for the treatment of meningitis
20	**Piperacillin + Tazobactam**	Beta lactam antibiotic + antibacterial	**General dosing** **Susceptible infection** 100 mg/kg/day
21	**Cetirizine**	Second generation histamine H1 antagonist	**For allergic rhinitis** **Oral:** Infants aged 6 to <12 months: 2.5 mg OD **For Allergic symptoms** **Children age** 2-5 years: initially 2.5 mg OD; dose may be increased to 2.5 mg BID or 5 mg OD; maximum daily dose, 5 mg/day
22	**Acetaminophen/ Paracetamol**	Non opioid analgesic and antipyretic	**Weight-directed dose** **Infants, children** **Oral:** 10-15 mg/kg/dose every 4-6 hours as needed Don't exceed 5 doses in 24 hours **Max. dose:** 75 mg/kg/day, not to exceed 4000 mg/kg/day **IV** 15mg/kg/dose Q6H, Max dose: 60 mg/kg/day
23	**Regular insulin**	short-acting insulin	**1. Initial dose:** 0.1-0.5 units/kg/dose, administered 30 minutes before meals.

			2. Maintenance dose: 0.5-1.5 units/kg/dose, administered 30 minutes before meals. ***[Sliding Scale Insulin (SSI) Dosing*** *A sliding-scale insulin (SSI) regimen may be used for pediatric patients who require more flexible insulin dosing.* ***1. SSI dosing:*** *The insulin dose is adjusted based on the child's current blood glucose level.* ***2. Example SSI regimen:*** ***| Blood Glucose Level | Insulin Dose |*** ***| --- | --- |*** ***| < 70 mg/dL | 0 units |*** ***| 71-150 mg/dL | 1-2 units |*** ***| 151-250 mg/dL | 3-4 units |]*** ***| > 250 mg/dL | 5-6 units |***

Important Considerations:
- Always use the child's current weight
- Be aware of potential medication errors (e.g., decimal place errors)
- Consult with a pharmacist or pediatrician if unsure about any calculation or dose

References:

- Meharban Singh and Ashok K. Deorari: Drug dosage in children; 8th edition